The Causal Relationship between Corruption and Poverty: A Panel Data Analysis

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Abstract

Most of the studies which have investigated the link between corruption and poverty may draw conclusions on causality in the form of models that only show correlation. This study is set out to investigate the Granger causal relationship between corruption and poverty. It uses dynamic panel system GMM estimators, focuses on capability poverty using human poverty index (HPI) and is based on a sample of 97 developing countries during 1997-2006. The empirical findings reveal that corruption and poverty go together, with bidirectional causality.

Keywords: Corruption, Poverty, Panel Data Analysis

JEL: C23, I3, K42

1. Introduction

Corruption is a cause of poverty and a barrier to successful poverty eradication. It could destroy the efforts of developing countries in order to alleviate poverty. Corruption's relation to poverty are numerous and common. In the public sector, corruption delays and diverts economic growth and deepens poverty. Alternatively, poverty invites corruption as it weakens economic, political and social institutions.

Corruption is one of the major determinants of poverty. Combating corruption is therefore a crucial part in the poverty reduction process. High levels of corruption aggravate the living conditions of the poor by distorting the entire decision making process connected with public sector programs. Corruption deepens poverty by hampering productive programs such as education and health care at the expense of larger capital intensive projects which can provide better opportunities to extract illegal incomes. Alternatively, social and income inequalities in poor countries make greater imbalances in the distribution of power and encourage corruption (Ndikumana, 2006).

Although the link between corruption and poverty is often noted (Husted, 1999, ACEG, 2000, Gupta et al., 2002, Gyimah-Brempong, 2002, and You and Khagram, 2005) the question of whether a causal relationship exists between corruption and poverty based on panel data models, has received less attention. In other words, most of the studies which have investigated the link between corruption and poverty may conclude on causality in models that only show correlation. Thus, the policy recommendation for fight against poverty and corruption can simply be wrong. Taking it to the limit, how good is it to try to decrease corruption by implementing anti poverty strategies if the high poverty level is simply caused by high corruption and not the other way around?

Therefore, this study is set out to investigate the Granger causal relationship between corruption and poverty. It uses dynamic panel system GMM estimators, focuses on capability poverty using human poverty index (HPI) since it portrays in a more accurate way the state of poverty, and is based on a sample of 97 developing countries during 1997-2006.

2. Literature Review

The theoretical and empirical literature on the relationship between corruption and poverty has been developed from the mid 1990s that some non government organizations such as transparency international (TI) have focused on the problems of corruption and the rights of citizens to participate in political, economic and social development processes and corruption indices have produced. International organizations such as IMF and World Bank have also played a growing role to help countries in overcoming corruption.

The theoretical propositions for the relationship between corruption and income inequality also arise from rent theory and the ideas of Rose-Ackerman (1978) and Krueger (1974). Corruption causes some groups and individuals permanently benefit more, the distributional effects of corruption are more rigid as the corruption continues and it is a function of government sharing in resource allocation (Gupta et al., 1998).

These theoretical propositions on the relationship between corruption and poverty are supported by numerous empirical studies. In a cross national analysis of the channels through which corruption adversely affects income distribution and poverty, Gupta et al. (1998) specified an inequality model using Gini coefficient to measure income inequality and several indices of corruption. In their study, they ascertained that increasing income inequality due to corruption reduce economic growth and thereby aggravate poverty. They also found that tax evasion and its exemption in favor of wealthy elites can reduce the tax base and leads to more income inequality as well as diverting benefits from poverty reduction measures due to poor targeting of social programs.

A World Bank study (2000) on whether there "is any apparent link, within Eastern Europe and Central Asia (ECA), between corruption and measures of income inequality" found that lower levels of corruption are statistically correlated with lower levels of income inequality and the results show that the costs of corruption place more burden on smaller firms.

Karstedt (2001) in her study of 35 OECD countries tested corruption against income distribution. Results showed that countries with high income inequality have high levels of corruption, while those with high levels of secondary education and a high proportion of women in government positions have experienced decreasing levels of corruption. The relation between corruption and income inequality was nonlinear, indicating that after countries attain a specific level of income equality, corruption exponentially decreases.

Dabla-Norris and Wade (2002) propose a theoretical model to explain why the rich tend to focus on gaining income from corrupt activities. Individuals face a fixed cost when they are looking for gains from corruption through government employment but not into productive activity. Another motivation for the rich to enter the corrupt government bureaucracy is that they can protect their own wealth from the corrupt appropriative activities of other government officials. So the model contains both supply and demand side reasons for why corrupt government is the domain of the wealthy. The poor are productive and are the martyr. The model is motivated by evidence that the rich in poor countries tend to keep themselves and their families in government employment and in control of government. Government officials also often have family businesses that are related to the officials' fields of authority.

You and Khagram (2005) believe that income inequality also increase the level of corruption through material and normative mechanisms. Their analysis of 129 countries using 2SLS methods with different

instrumental variables supports their hypotheses using different measures of corruption. Because income inequality also contributes to corruption, societies often fall into vicious circles of inequality and corruption.

Dincer and Gunalp (2008) analyzed the impact of corruption on income inequality and poverty in the United States using an objective measure of corruption, different measures of inequality and income poverty, time series and cross sectional data. The results show robustly that increasing corruption leads to increases income inequality and poverty.

There is an agreement that inequality also contributes to high levels of corruption. While corruption may lower GDP, poorer countries may not effectively fight corruption due to lack of the resources (Husted, 1999) and (Paldam, 2002). You and Khagram (2005) provide evidence for reverse causality. They argue that the poor are not able to monitor the rich and it enables them to misuse their position.

3. Model and Econometric Methodology

The empirical model is aimed at investigating the Granger causal relationship between corruption and poverty using dynamic panel system GMM estimators. Thus, the empirical model that employed in the analysis is as follows:

$$y_{it} = \alpha + \sum_{j=1}^{m} \delta_j y_{i,t-j} + \sum_{l=1}^{n} \beta_l x_{i,t-l} + \sum_{k=1}^{r} \gamma_k z_{i,t-k} + u_{it} \qquad (1)$$

Where the causality-based variables x and y are corruption or poverty. I use from major control variables (z) as mediators between corruption and poverty including inflation, political freedom and stability, rural population, and gender.

Inflation: Different aspects of macroeconomic instability, as well as low growth rates, can place a heavy burden on the poor. Inflation, as one of the aspects of macroeconomic instability, is a regressive tax, which its burden is especially carried by those in lower income groups since the poor tend to hold most of their wealth in the form of cash, and also they are commonly less able than the rich to secure the real value of their incomes and wealth from inflation. Therefore, price increasing generally erode the real wages and assets of the poor more than those of the rich. Moreover, beyond certain thresholds, inflation also constraints output growth, an effect that will influence even those among the poor who infrequently use money for economic transaction (Ames et al., 2002).

Where agents can inflate the price of goods which is needed to start an investment project, high and variable inflation may increase the cost of monitoring the agent. So it causes higher corruption and lower investment (Braun and Di Tella, 2000).

Political Freedom and Stability: Kaufmann et al. (1999) define governance as, "The traditions and institutions by which authority in a country is exercised. This includes (1) the process by which governments are selected, monitored and replaced, (2) the capacity of the government to effectively formulate and implement sound policies, and (3) the respect of citizens and the state for the institutions that govern economic and social interactions among them."

Lack of transparency in rules, laws, and processes makes a breeding ground for corruption. Rules are often not clear and only trained lawyers can understand them. Their specifying documents are also not available for all people (Tanzi, 1998). In many countries, there are many regulations and authorizations which give monopoly power to authorizing officials. Therefore, who need the authorizations or permits may have to pay bribes to these officials who must authorize or inspect their activities.

On the other hand, political freedom and stability reduces poverty in different dimensions including empowerment, capabilities, opportunities, and security. The poor can influence policy making, budget priorities, and program designing through participating in political and administrative processes. It increases the poor access to markets of lands, credit and labor leading them to enter in more profitable activities, which is important for reducing vulnerability to agricultural shocks. Thus, governments need to reform the regulations to improve market access, and distribute information to the poor about opportunities for employment, asset ownership, and local and international prices as the measures of poverty reduction. By improving voice and accountability and limiting exploitation by police, governments can also reduce vulnerability to crime, violence, and corruption of the poor (Girishankar et al., 2002).

Gender: Women's participation in public sector reduces corruption in business and government. Several studies show that in countries whit high gender equality, the level of corruption is lower (Dollar and Gatti, 1999, Swamy et al., 1999). This is true even when countries with the same civil liberties, education, legal institutions, and GDP are compared. Then, in order to lower the level of corruption, it may be better to design policies to improve the role of women in public life. Gender disparities are not only inequitable but also have economic consequences such as slowing down growth and increasing poverty. Evidences show that growth and social development significantly affects poverty outcomes. It means that for ultra-poor households, women have crucial role to prevent increasing their poverty. Strategies to improve women's economic participation can increase their potential for reducing household poverty (Subbarao and Ezemenari, 1995).

Rural Population: In spite of large rural populations, they often lack communication infrastructure which makes it difficult to form interest integrations to shape or even follow national policy debates. The diversity of rural societies also creates shocking obstacles to participation. In some regions, there are different ethnic, linguistic, religious or cultural groups, which in turn build large diversity in social, economic and political power. Understanding these power differences and the forms of exclusion leaving some groups with much less voice and security than others, is necessary to establish participation mechanisms to ensure the inclusion of excluded groups. Promoting the rural infrastructure can be a tool for improving local governance and reducing corruption through the establishment of transparent and accountable practices for priority setting, decision making, implementation, operations and maintenance.

Furthermore, in most developing countries the likelihood of being poor and the severity of poverty are more in rural areas due to five characteristics of rural space; a strong dependency on the natural resources to confirm livelihoods leading to high risk environment, a low population density and geographic constraints leading to high transaction costs and limited access to physical and social infrastructure, an illegal economy, which makes it more difficult for policy makers to provide targeted poverty reduction measures, cultural and linguistic differences leading to limited voice and participation in national and even local decision making processes, not recognizing the important role of women in income generating programs (Cord, 2002). In spite of the importance of rural sector for economic growth strategies and poverty elimination, rural stakeholders' interests are often weakly represented in national policymaking processes, including in many Poverty Reduction Strategy Paper (PRSPs). Nearly 75 percent of the world's poor are located in rural areas and by this trend, the global percentage of rural poor will not fall below 50 percent before 2035 (Ravallion, 2000, and Alderman 2001).

In equation (1); $t = 1,...,T$ is time and $i = 1,...N$ is cross section and m , n and r are the number of lags. It is assumed that the u_{it} follow a one-way error component model:

$$u_{it} = \mu_i + \lambda_t + v_{it} \qquad (2)$$

Where $\mu_i \sim IID\left(0, \sigma_\mu^2\right)$ is the unobserved country-specific effect, $\lambda_t \sim IID\left(0, \sigma_\lambda^2\right)$ represents period-specific effects and $v_{it} \sim IID\left(0, \sigma_v^2\right)$ the error term. The dynamic panel data regressions described in (1) and (2) are characterized by two sources of persistence over time, autocorrelation due to the presence of a lagged dependent variable among the regressors and individual effects characterizing the heterogeneity among the individuals. Since y_{it} is a function of μ_i, it follows that $y_{i,t-1}$ is also a function of μ_i. Therefore, $y_{i,t-1}$, a right-hand regressor in (1) is correlated with the error term. This renders the OLS estimator biased and inconsistent even if the v_{it} are not serially correlated.

In panel estimation, neither the Generalized Least Squares (GLS) estimator nor the Fixed Effect (FE) estimator will produce consistent estimates in the presence of dynamics and endogenous regressors (Baltagi 1995). Arellano and Bond (1991) have proposed a dynamic panel General Method of Moments (GMM) estimator which is an instrument variable (IV) estimator that uses all past values of endogenous regressors as well as current values of strictly exogenous regressors as instruments. Estimates can be based on first difference, or on orthogonal deviations.

Arellano- Bond estimation starts by transforming all regressors, usually by differencing, and uses the Generalized Method of Moments, and so is called Difference GMM. The Arellano-Bover/Blundell-Bond estimator augments Arellano-Bond by making an additional assumption, that first differences of instrument variables are uncorrelated with the fixed effects. This allows the introduction of more instruments, and can

dramatically improve efficiency. It builds a system of two equations-the original equation as well as the transformed one- and is known as System GMM. It is preferred to difference GMM since finite sample bias problem caused by weak instruments in first differenced GMM will be addressed by using system GMM. It also offers forward orthogonal deviations, an alternative to differencing that preserves sample size in panels with gaps. And it allows finer control over the instrument matrix.

Both Difference GMM and System GMM are general estimators designed for situations with 1) "small T, large N" panels, meaning few time periods and many individuals; 2) a linear functional relationship; 3) a single left-hand-side variable that is dynamic, depending on its own past realizations; 4) independent variables that are not strictly exogenous, meaning correlated with past and possibly current realizations of the error; 5) fixed individual effects; and 6) heteroskedasticity and autocorrelation within individuals but not across them. Arellano and Bond proposed two estimators -one- and two-step estimators- with the two-step estimator being the optimal estimator. The Sargan test of over- identifying restrictions is performed which is a joint test of model specification and appropriateness of the instrument.

The test of whether x Granger-causes y consists of a test of the hypothesis that $\beta_1 = \beta_2 = ... = \beta_n$ are equal to zero (Wald test) after controlling for y's own lags and the influence of additional controls (z).

4. Data

Until few years ago, few economists considered corruption as a researchable phenomenon. It was not researchable due to lack of quantitative data. Although the early efforts of the Rose-Ackerman (1978) lead to designing interesting models, quantitative data were missing until the mid 1990s that CPI was published. The publication of this data has made corruption and poor governance to be a public challenge.

Corruption Perceptions Index (CPI): The annual CPI is the best known TI index of corruption. It ranks 180 countries from one to ten (with 10 being low) by their perceived levels of corruption, as determined by expert assessments and opinion surveys.

Although critics believe that CPI still has important weaknesses, it has received wide publicity and fulfils Transparency International's aim of raising public and political awareness of corruption. But as the CPI is based on the perception, its results should be interpreted with caution.

Human Poverty Index (HPI): The HPI-1 is the human poverty index for developing countries. It is discarded income in the variable mix and included only "the most basic dimensions of deprivation: a short life, lack of basic education, and lack of access to public and private resources" (Doraid, 1997). The formula used to calculate the HPI-1 is:

$$\text{HPI-1} = \left[1/3\left(P_1^{\alpha} + P_2^{\alpha} + P_3^{\alpha}\right)\right]^{1/\alpha}$$

where:

P_1 = Probability at birth of not surviving to age 40(times 100)

P_2 = Adult illiteracy rate

P_3 = 1/2(population not using an improved water source) + 1/2(children under weight for age)

$\alpha = 3$

Political Freedom and Stability: The institutional quality data sets are assembled dataset by Kaufmann et al. (2008). These indicators are based on information collected through numerous cross-country surveys and polls of experts. Kaufmann et al. (2008) use a model to coverage approximately 212 countries for each of their indicators. They introduces six different indicators that each of them represents a different dimension of governance: (i) Voice and Accountability, (ii) Political Stability and Lack of Violence, (iii) Government Effectiveness, (iv)Regulatory Quality, (v) Rule of Law, and (vi) Control of Corruption. Because of collinearity between these indicators, the average of voice and accountability, and political stability is defined as the political freedom and stability and average of government effectiveness, regulatory quality and rule of law as the government efficiency.

5. Empirical Results

The Granger causality between corruption and poverty is explored using two step system GMM method with t-values and test statistics that are asymptotically robust to general heteroscedasticity and corrected for

a small sample bias. To investigate Granger-causality relationship between corruption and poverty, two cases are considered: (i) corruption does not Granger-cause poverty, and (ii) poverty does not Granger-cause corruption.

5.1. Effects of Corruption on Poverty, Two Step System GMM Estimation

The empirical results of the poverty equations are presented in Table 1 which its columns present different specifications of the poverty equation. In all models the variable of interest is corruption.

In specification 1, there is no control variable while in specification 2; rural population (% of total population) is used as a control variable. In specification 3, gender (female labor force participation rate) variable is added to rural population as another control variable and in specification 4, inflation is added to rural population and gender as the other control variable and finally in specification 5 the indicator of political freedom and stability is added to rural population, gender, and inflation as a control variable.

In all specifications, year dummies and levels equation are used as instrument variables because all other regressors are not strictly exogenous. The poverty equation fits the data well as indicated by the regression statistics. In all specifications, the lags length of corruption is four and the lags length of dependent variable (poverty) is two. In general, the optimal lag is selected until no serial correlation in residual is obtained (Arellano, 2003). Therefore, to select the optimal lag, the AR(1) and AR(2) statistics are employed. The results in all specifications suggest that there is a significant relationship between corruption and poverty.

The rural population in specifications 2-5 has a positive effect on the poverty as expected and is statistically significant at 1% level. This positive effect is consistent with Ravallion (2000), Alderman (2001), and Cord (2002) who argue that in developing countries the likelihood of being poor and the severity of poverty are more in rural areas. In specifications 3-5, the coefficient of gender is negative and significant at 1% level indicating that women have crucial role to prevent increasing household poverty. The result is consistent with Subbarao and Ezemenari (1995). The lagged inflation has a statistically significant positive effect (1% level) on the poverty in specifications 4 and 5 which is consistent with Ames et al. (2002), and finally in specification 5, the political freedom and stability as a governance indicator, has a statistically significant negative effect on poverty at 1% level. The expected negative coefficient of political freedom and stability is consistent with the findings of Girishankar et al. (2002).

The Granger-causality effect can be captured through the significance tests of the coefficients of the lagged corruption variable equal to zero. If the null hypothesis of no causality is rejected, then one may conclude that corruption Granger-caused poverty. For this, the Granger causality test (Wald test) is used for all specifications. The result indicates that corruption causes poverty at 1% level. That is, past information on corruption help improve prediction of poverty.

5.2. Effects of Poverty on Corruption, Two Step System GMM Estimation

The estimates of corruption equations are presented in Table 2 which its columns present different specifications of the corruption equation. In all models the variable of interest is poverty.

There is no control variable in specification 1 while in specification 2; rural population (% of total population) is used as a control variable. In specification 3, gender (female labor force participation rate) variable is added to rural population as another control variable and in specification 4, inflation is added to rural population and gender as the other control variable and finally in specification 5 the indicator of political freedom and stability is added to rural population, gender, and inflation as a control variable.

In all specifications, year dummies and levels equation are used as instrument variables because all other regressors are not strictly exogenous. The corruption equation fits the data well as indicated by the regression statistics. According to the AR(1) and AR(2) statistics, in all specifications, the lags length of poverty is three and the lags length of dependent variable (corruption) is also three. The results of all specifications suggest that there is a significant relationship between poverty and corruption.

The coefficient of lagged rural population in specifications 2-5 is negative as expected and significantly different from zero at 1% level indicating that increased rural population is associated with increased corruption (reduction in CPI). This positive effect is consistent with Cord (2002). In specifications 3-5, the coefficient of lagged gender is positive but insignificant. In other words, increasing women role in public

life is associated with decreasing corruption (increasing CPI). This negative effect is consistent with Dollar and Gatti (1999), and Swamy et al. (1999).

In specifications 4 and 5, the coefficient of inflation is negative and significantly different from zero at 1% level indicating that increased inflation increases corruption (decreases CPI). This result is consistent with Braun and Di Tella (2000), and finally in specification 5, the coefficient of political freedom and stability is positive and statistically significant at 1% level. The expected positive coefficient of political freedom and stability indicates that increasing political freedom and stability as a governance indicator decreases corruption (increases CPI). This result is consistent with Tanzi (1998).

The Granger-causality effect can be captured through the significance tests of the coefficients of the lagged corruption variable equal to zero. If the null hypothesis of no causality is rejected, then one may conclude that poverty Granger-caused corruption. For this, the Granger causality test (Wald test) is used for all specifications. The result indicates that at 1% level, poverty causes corruption. That is, past information on poverty help improve prediction of corruption.

5.3. Diagnostic Test

Three types of diagnostic test are used for validity of the empirical models. First, the Sargan test of identifying restrictions under the null hypothesis of the validity of the instruments (Arellano and Bond, 1991). The results of the Sargan test in system GMM estimator are reported in Tables 4.1 and 4.2. Based on the Sargan test statistic for all models, the high p-value indicates that the null hypothesis of no over-identifying restrictions fail to reject. Therefore, the Sargan test statistics indicate that all specifications are well specified and that the instrument vector is appropriate.

The second test is proposed by Arellano and Bond (1991), which examines the hypothesis that the residual from the estimated regressions is first-order correlated but not second-order correlated. The second test examines the statistics (AR(1) and AR(2)) for presence of serial correlation in the first differenced residuals of first and second order, reported as the asymptotically standard normal distribution values. The results of the test for first-order autocorrelation AR(1) indicate that the null hypothesis is rejected; the p-values of the Arellano and Bond statistics in Tables 4.1 and 4.2 are significant at the 1% level.

The test results for second-order autocorrelation AR(2) fail to reject the null hypothesis of no autocorrelation and the statistics reported are p-values, giving the probability of correctly rejecting the null hypothesis of no autocorrelation. The absence of serial correlation shows the differenced residuals by significant negative first-order serial correlation and no second-order serial correlation. Therefore, the Arellano-Bond test statistics show that the instruments used are independent of the error term (no autocorrelation) and hence appropriate for the estimation; overall, the first and the second order serial correlation tests are all satisfied. The third test statistics also reject the null hypothesis that the time dummies are jointly equal to zero at the 1% level.

6. Conclusion and Policy Implications

This paper studies the causal relationship between corruption and poverty. In order to achieve this objective, data of 97 developing countries during 1997-2006 and causality methods GMM estimators developed for dynamic panel data is used. By focusing on capability poverty using the HPI, the empirical findings suggest that corruption and poverty go together, with causality running in both directions. Hence, it is necessary to address the integrated strategy to reduce poverty and fight corruption. In other words, the attempts to reduce poverty must be complemented by serious efforts to reduce corruption.

Combating corruption under the heading "strengthening good governance" plays a key role in poverty reduction (TI, 2008). Fighting against poverty and corruption includes improving citizen engagement and a state's accountability. Since marginalization and political, economic and social exclusion are highest for the poor, they are most frequently forced to resort to corrupt practices. This makes a big challenge for the development community. If anticorruption programs are not linked to alternative basic needs interventions, they will have a negative impact on the people who need help. To have effective pro-poor anti-corruption strategies, the inclusion of social, political and cultural capital into the analysis of poverty is necessary. These strategies must look more closely at factors that limit opportunities for poor citizens' access to political and economic decision making.

This study suggests that there are at least three categories of pro-poor anti-corruption interventions in developing countries. These are promoting inclusiveness, promoting lawfulness, and promoting accountability.

Promoting Inclusiveness: Social exclusion that limits citizens' participation in political, economic and social processes is contrary to pro-poor anticorruption efforts. Disenfranchising of citizens from society is inconsistent with the concept of good governance and theoretically has no place in democratic societies. It can be redressed by empowering groups which have been historically marginalized. Hence, inclusiveness is related closely to issues of empowerment and decentralization.

Promoting Lawfulness: Lawfulness is closely related to issues of justice, criminality, conflict resolution, social violence, peace and security, and human rights. Anderson (1999) figures a number of mechanisms through which lawlessness and poverty correlated to each other.

Violence by police, prison officers and other public officials has great effect on the poor, the abuses of human rights, official harassment, and police may disproportionately affect the poor. The poor are more vulnerable to arbitrary treatment, intimidation and humiliation by public officials, and they are at greater risk of losing their property to public or private theft.

Promoting Accountability: Accountability means that government remains responsive for its actions and could be sanctioned. A significant step to develop a pro-poor anti-corruption strategy is linking the rights of marginalized communities and individuals to more accountable governments. By promoting political accountability, the poor are seen not as victims but rather as stakeholders in combating corruption (Eberlei, 2007).

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Table 1: The Estimated Results from the Two Step Dynamic Panel GMM-SYS (Effects of Corruption on Poverty)

Dependent variable: $\log(HPI)_t$	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
$\log(HPI)_{t-1}$	0.985	0.927	0.963	0.936	0.986
	(51.61)***	(42.83)***	(32.60)***	(27.78)***	(24.34)***
$\log(HPI)_{t-2}$	0.005	-0.086	-0.118	-0.090	-0.119
	(0.21)	(-4.39)***	(-4.44)***	(-3.67)***	(-5.37)***
$\log(CPI)_{t-1}$	0.047	0.015	0.010	-0.024	0.013
	(1.53)	(0.52)	(0.37)	(-0.76)	(0.45)
$\log(CPI)_{t-2}$	0.043	0.045	0.032	0.021	0.021
	(1.89)*	(1.38)	(1.22)	(0.85)	(0.78)
$\log(CPI)_{t-3}$	0.273	0.248	0.267	0.262	0.256
	(15.81)***	(9.45)***	(10.87)***	(10.18)***	(6.66)***
$\log(CPI)_{t-4}$	-0.106	-0.071	-0.068	-0.077	-0.051
	(-3.51)***	(-2.50)**	(-2.29)**	(-2.62)***	(-1.07)
$\log(Rural)_t$		0.281	0.241	0.246	0.203
		(6.69)***	(7.17)***	(5.26)***	(2.92)***
$\log(Gender)_t$			-0.190	-0.141	-0.256
			(-2.79)***	(-3.00)***	(-5.75)***
$\log(Inflation)_{t-2}$				0.017	0.013
				(6.12)***	(5.36)***
$\log(politicalfreedom)_t$					-0.099
					(-4.60)***
$dummy2001$	0.048	0.075	0.071	0.068	0.071
	(11.60)***	(13.30)***	(10.87)***	(8.23)***	(8.68)***
$dummy2002$					
$dummy2003$					
$dummy2004$	0.022	0.015	0.017	0.018	0.016
	(11.17)***	(2.87)***	(3.08)***	(3.03)***	(2.42)**
$dummy2005$					
$-cons$	-0.322	-0.895	-0.027	-0.198	0.634
	(-4.00)***	(-5.06)***	(-0.09)	(-0.82)	(2.06)**
Number of observation	236	232	232	221	221
Number of groups	52	51	51	51	51
AR(1), (p value)	0.000	0.000	0.000	0.001	0.002
AR(2), (p value)	0.133	0.129	0.131	0.242	0.193
Sargan test, (p value)	0.221	0.291	0.324	0.338	0.338
Wald test $(H_0 : \log(CPI)_{t-i} = 0)$	(278.2)***	(119.3)***	(120.2)***	(170.2)***	(87.2)***
Wald test $(H_0 : dummy_t = 0)$	(360.8)***	(181.6)***	(140.9)***	(102.3)***	(88.5)***

Notes: All models are estimated using the Arellano and Bond dynamic panel system GMM estimations (Stata xtdpdsys command). Figures in the parentheses are t-statistics. *** Significant at the 1 percent level, ** Significant at the 5 percent level and * Significant at the 10 percent level.

Table 2: The Estimated Results from the Two Step Dynamic Panel GMM-SYS (Effects of Poverty on Corruption)

Dependent variable: $\log(CPI)_t$	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
$\log(CPI)_{t-1}$	0.734	0.661	0.648	0.556	0.498
	(22.96)***	(18.49)***	(16.68)***	(12.75)***	(11.72)***
$\log(CPI)_{t-2}$	0.061	0.077	0.088	0.083	0.083
	(2.76)**	(3.38)***	(4.19)***	(4.07)***	(4.76)***
$\log(CPI)_{t-3}$	-0.007	-0.009	-0.006	0.003	0.001
	(-0.53)	(-0.70)	(-0.52)	(0.35)	(0.09)***
$\log(HPI)_{t-1}$	-0.184	-0.109	-0.103	-0.081	-0.102
	(-7.30)***	(-4.02)***	(-3.87)***	(-2.56)**	(-3.64)***
$\log(HPI)_{t-2}$	0.159	0.185	0.175	0.128	0.138
	(4.36)***	(5.45)***	(5.33)***	(4.45)***	(4.67)***
$\log(HPI)_{t-3}$	-0.074	-0.032	-0.018	0.006	-0.004
	(-3.04)***	(-1.46)	(-0.82)	(0.27)	(-0.18)
$\log(Rural)_{t-1}$		-0.295	-0.346	-0.427	-0.329
		(-5.02)***	(-5.49)***	(-7.52)***	(-4.77)***
$\log(Gender)_{t-1}$			0.069	0.076	0.013
			(1.45)	(1.21)	(0.24)
$\log(Inflation)_t$				-0.008	-0.008
				(-4.22)***	(-2.91)***
$\log(politicalfreedom)_t$					0.069
					(3.61)***
$dummy2000$	0.015	0.013	0.015	0.024	0.019
	(1.90)*	(1.63)	(1.98)**	(2.84)***	(2.44)**
$dummy2001$					
$dummy2002$	0.043	0.040	0.038	0.033	0.033
	(7.48)***	(6.37)***	(6.35)***	(5.34)***	(5.60)***
$dummy2003$					
$dummy2004$	0.042	0.028	0.028	0.028	0.032
	(7.55)***	(4.84)***	(5.24)***	(5.18)***	(5.08)***
$dummy2005$	0.038	0.031	0.029	0.033	0.038
	(6.71)***	(7.48)***	(8.01)***	(6.56)***	(6.26)***
$dummy2006$	0.039	0.027	0.025	0.029	0.036
	(5.78)***	(5.01)***	(4.09)***	(5.03)***	(5.96)***
$-cons$	0.498	1.269	1.162	1.557	1.315
	(6.37)***	(6.71)***	(5.40)***	(4.87)***	(4.53)***
Number of observation	300	297	297	286	286
Number of groups	68	67	67	64	64
AR(1), (p value)	0.001	0.002	0.003	0.007	0.008
AR(2), (p value)	0.846	0.567	0.505	0.641	0.631
Sargan test, (p value)	0.215	0.286	0.282	0.329	0.269
Wald test $(H_0 : \log(HPI)_{t-i} = 0)$	(93.7)***	(38.5)***	(39.8)***	(24.2)***	(26.6)***
Wald test $(H_0 : dummy_t = 0)$	(239.3)***	(193.3)***	(196.5)***	(157.1)***	(146.1)***

Notes: All models are estimated using the Arellano and Bond dynamic panel system GMM estimations (Stata xtdpdsys command). Figures in the parentheses are t-statistics. *** Significant at the 1 percent level, ** Significant at the 5 percent level and * Significant at the 10 percent level.

Table 3: Countries included in the Analysis

Algeria	Indonesia	Sudan
Bangladesh	Iran, Islamic Rep.	Swaziland
Barbados	Jamaica	Syrian Arab Republic
Benin	Jordan	Tanzania
Bhutan	Kenya	Thailand
Bolivia	Lao PDR	Togo
Botswana	Lebanon	Trinidad and Tobago
Brazil	Lesotho	Tunisia
Burkina Faso	Libya	Turkey
Burundi	Madagascar	Uganda
Cambodia	Malawi	United Arab Emirates
Cameroon	Malaysia	Uruguay
Cape Verde	Maldives	Venezuela, RB
Central African Republic	Mali	Vietnam
Chad	Mauritania	Yemen, Rep.
Chile	Mauritius	Zambia
China	Mexico	Zimbabwe
Colombia	Mongolia	
Comoros	Morocco	
Congo, Dem. Rep.	Mozambique	
Congo, Rep.	Myanmar	
Costa Rica	Namibia	
Cote d'Ivoire	Nepal	
Cuba	Nicaragua	
Djibouti	Niger	
Dominican Republic	Nigeria	
Ecuador	Oman	
Egypt, Arab Rep.	Pakistan	
El Salvador	Panama	
Eritrea	Papua New Guinea	
Ethiopia	Paraguay	
Fiji	Peru	
Gambia, The	Philippines	
Guatemala	Rwanda	
Guinea	Saudi Arabia	
Guinea-Bissau	Senegal	
Guyana	Sierra Leone	
Haiti	Singapore	
Honduras	South Africa	
India	Sri Lanka	

Table 4: Sources and Characteristics of Sample Data

Variables	Unit of Measurement	Abbreviation	Mean	SD	Min	Max	Obs.	Data Source
Corruption Perception Index	0-10	*CPI*	3.387	1.453	0.4	9.4	583	TI
Inflation	%	*Inflation*	12.175	49.766	-9.89	1096.6	868	WDI
Rural Population	% of total population	*Rural*	54.951	22.598	0	92.18	970	WDI
Female Labor Force Participation Rate	%	*Gender*	54.325	17.245	16.2	93.2	970	WDI
Political Freedom and Stability	Standard deviation	*political freedom*	35.288	19.206	0.961	89.423	970	Kaufmann et al. (2008)
Human Poverty Index	%	*HPI*	27.948	15.531	2.5	65.5	920	HDR, UNDP